AIR WEATHER SERVICE
Technical Report No. 105-73

FORECASTING FOG

IN THE

BRAHMAPUTRA VALLEY

HEADQUARTERS
AIR WEATHER SERVICE
Washington 25, D. C.
March 1951

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Air Weather Service Technical Report No. 105-73, "Forecasting Fog in the Brahmaputra Valley," is published for the information and guidance of all concerned.

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PREFACE

This report was initially published in the 10th Weather Squadron, USAAF, by 1st Lt. (now Captain) Donald E. Martin and M/Sgt. (now 1st Lt.) Paul W. Bauer, who were at that time forecasters in India. The purpose of the study was to present certain practical aids to forecasting fog in the Brahmaputra Valley and to aid in indoctrinating new personnel.

The method outlined in this report was used successfully by numerous forecasters in India during World War II. Recently, some modifications of the technique have been made by Captain Martin since it is felt that the same general approach for forecasting radiation fog can be applied in many other parts of the world. It must be stressed, however, that the forecaster must always take into account the local conditions of any particular airfield since peculiarities in terrain or circulation will materially influence the time of formation and the intensity of the fog.

Headquarters, AWS
March 1951

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I. CONDITIONS FAVORABLE FOR FOG FORMATION IN THE BRAHMAPUTRA VALLEY IN WINTER

Throughout the length of the Brahmaputra Valley conditions are ideal for the formation of radiation fog during the fall and early winter months. The circulation is governed by the Northeast Monsoon which produces a weak northeasterly wind flow over the region. The wind velocity is sufficient to stir the air during the hours of fog and to cause conduction cooling in the lower levels. The topography of the valley is smooth and level. Sufficient moisture is available from the broad expanses of the Brahmaputra River, nearly stagnant at this season, to allow the lower layers of air to form aerial lakes necessary for the formation of this fog. Also, transpiration of the thick masses of jungle vegetation adds to the moisture already present in the air.

The upper air situation is typical of a continental high, with subsidence inversions and stable lapse rates. Any clouds that form in the early afternoon by convective activity are usually dwarfed in their development. The average number of miles of wind per day is approximately 75 to 100; and, since there is a good network of reports throughout the valley, it is easy to figure the trajectory of the air. During this season of the year, the haze and the accumulated smoke from the many Indian fires are sufficient to act as condensation nuclei for the fog.

The forecasting method described below was used at Lalmanir Hat to forecast the formation of radiation fog. Lalmanir Hat has a latitude

of 29°53'N and a longitude of 89°26'E. The station is situated at a height of 106 feet above sea level. A small body of water is located immediately to the north of the station. The runways of the landing field are concrete and are oriented from east to west. The fog begins to form over the hills and drains into the river valleys where it accumulates and spreads over the runways with the light northeasterly winds of this season. When due consideration had been given to local conditions and a thorough analysis made of the synoptic weather data, it was found possible to forecast this fog for 24 to 30 hours in advance with a high degree of accuracy. This method was later checked against the records of the other valley stations and found to be essentially applicable to them as well.

II. FOG FORECASTING BY THE USE OF POTENTIAL TEMPERATURE AT THE CONVECTIVE CONDENSATION LEVEL

It was assumed that if two variables which are related to the conditions necessary for the formation of this fog could be found, a variance in these would be invaluable in determining the actual time of fog formation.

Potential temperature is a relatively conservative property of an air mass. It is a function of temperature and pressure and varies by the advection of warm or cold air. Cold-air advection will cause a potential-temperature line to intersect the radiosonde curve at a higher level, and warm-air advection will create a reverse situation. Assuming dry-adiabatic conditions down from the convective cloud level, a close estimate of the maximum temperature for that day may be calculated.

The thickness of this adiabatic lapse rate, i.e. the distance from the surface to the convective-cloud level governs the extent of the vertical mixing in the lower layers. Also, when this condensation level is lower, more clouds may be expected to form which will reflect much of the day time radiation from the sun into space.

The convective condensation level is the height at which air reached saturation when heated from below to such an extent that it ascends adiabatically because of instability forces. This level is a function of the amount of moisture, the temperature, and the pressure of the air, and is related to the amount of vertical motion in the lower layers of the atmosphere. Therefore, the potential temperature at this level should be an invaluable factor in the prediction of fog. When such information is further supplemented by a thorough knowledge of local topography and a detailed analysis of the upper air for cloudiness and the lower air for stability, accurate fog forecasts can be made.

Increased moisture in the surface layers causes a lower convective condensation level, and a lesser height to which this moisture is transported aloft by turbulence. Therefore, the larger the concentration of moisture in the lower levels, the earlier the time at night when conditions are suitable for the formation of fog. Conversely, a decreased concentration of moisture in the surface layers causes a high condensation level and a transport of moisture to higher levels. The formation of fog is thus delayed because the spread between the maximum daytime temperature and the dewpoint temperature is increased. On nights following days with low convective condensation level, the saturation temperature is reached early and the nocturnal inversion is allowed to

intensity. Fog, therefore, forms earlier and is more persistent.

A graph was made of the potential temperature at the convective condensation level versus the time when fog formation reduced the visibility to less than one mile (Fig. 1).* Using this diagram in connection with the evening sounding, a reasonably accurate forecast could be made from 24 to 30 hours in advance. By comparing such a forecast with the actual conditions which occurred during the period of the forecast, it was possible to deduce the following method for making shorter range forecasts.

In the afternoon, during the time of maximum convection, the nature of the sky was thoroughly studied and the height of the convective clouds was determined. This was ascertained from balloon runs, accurate pilot reports, and from the use of the formula $4.4h = 1{,}000\ (T-T_w)$ where T is temperature in degrees Fahrenheit and T_w is dewpoint temperature. A chart was constructed based on this formula (Fig. 2) which gave the height in terms of the temperature-dewpoint spread. This height was then noted on the previous raob to determine the trend of the convective condensation level. If the trend was found to lower, a forecast was made using the new potential temperature on Fig. 1. With a lowering trend, conditions were more favorable for heavy fog formation. A rising trend produced opposite results. The shorter-range forecast was found to be

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* The dispersion of data used in the construction of Fig. 1 is no longer available and was not included in the original 10th Weather Squadron report due to reproduction difficulties. It may be stated, however, that the points were closely clustered around the smoothed curve.

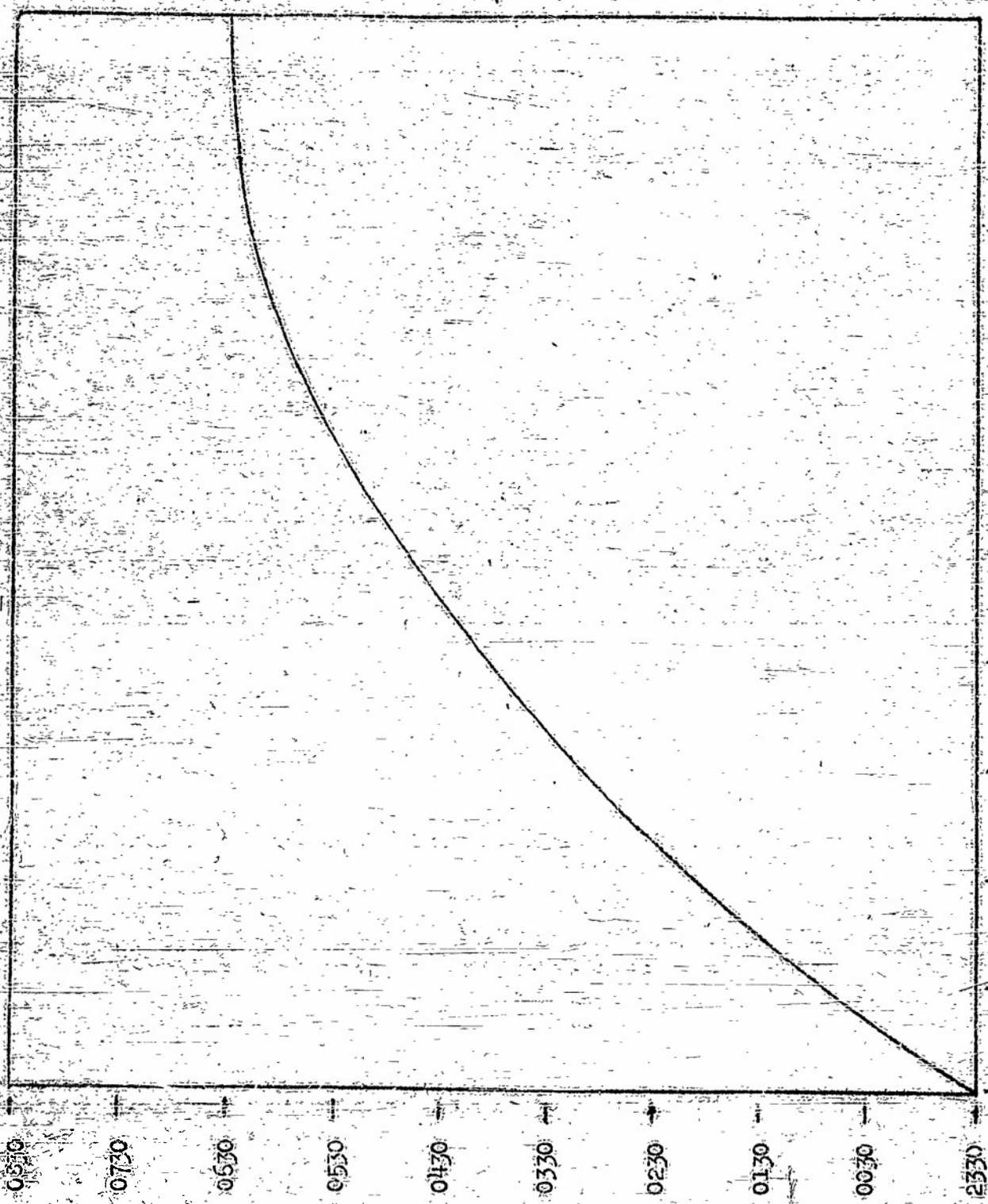

FIG. 1. Chart showing the time when fog formation will reduce visibility to less than one mile in terms of potential temperature at the convective condensation level.

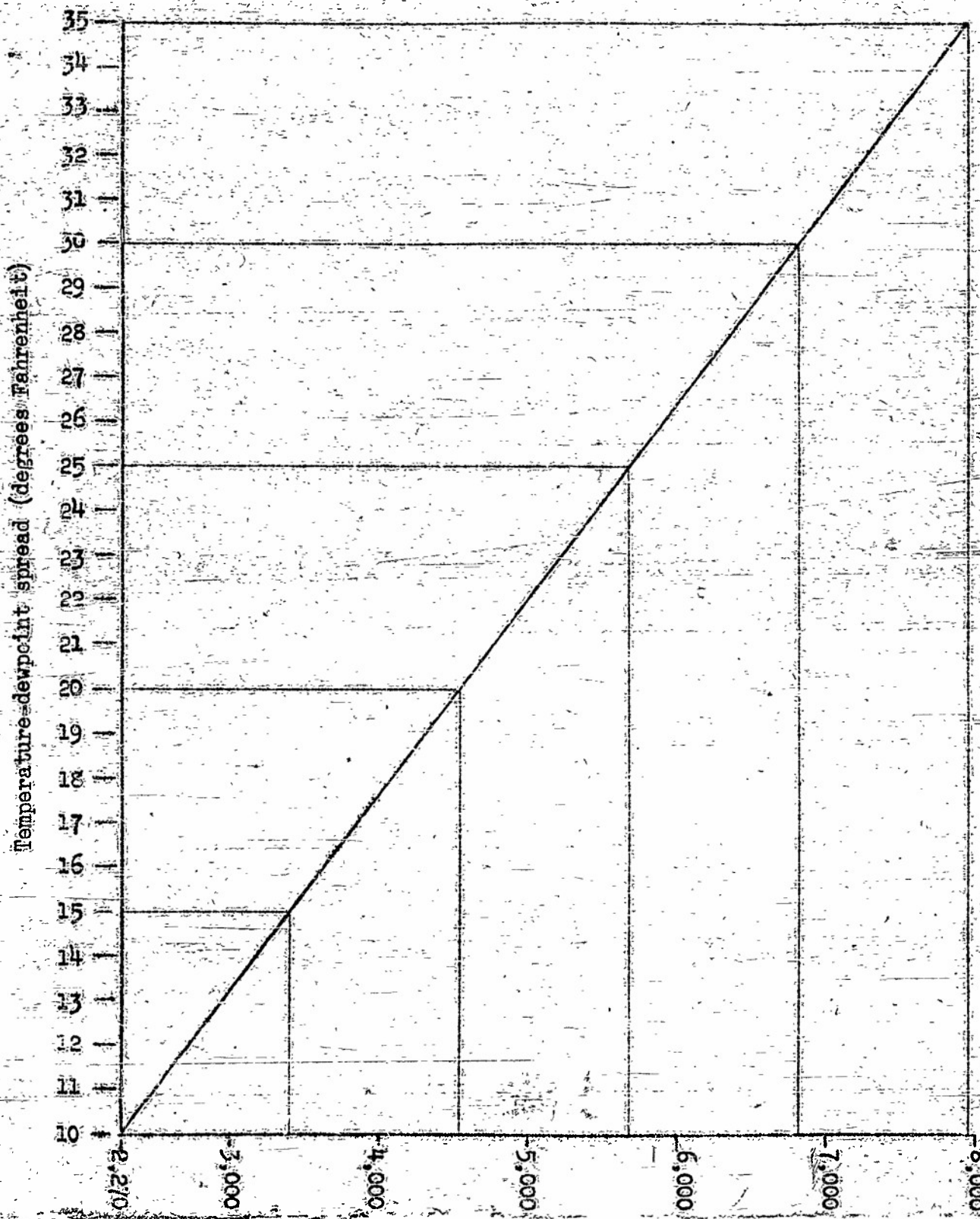

FIG. 2. Chart showing the height of the base of convective clouds in terms of the temperature-dewpoint spread at the surface (based on the following formula: $4.4h = 1{,}000(T - T_w)$, where T is temperature in degrees Fahrenheit and T_w is dewpoint temperature).

particularly valuable on days when rain had increased the moisture content in the air after the evening raob was taken. Such a forecast also served as a check on the longer-range forecast, which may have been altered by unforeseen changes in synoptic conditions.

The convective condensation level was determined on the adiabatic chart by finding the point on the sounding where the saturated mixing ratio line, having a value equal to the average mixing ratio in the first kilometer above the surface, intersected the sounding.

For stations not having raobs, the convective condensation level was found from the afternoon observations and plotted on a neighboring sounding to determine the potential temperature value.

In practical application, the forecasters at Jorhat found that absolute pressure values at the convective condensation level gave comparable results to the potential temperature parameter. The forecasters at Chabua preferred the absolute height of the convective condensation level. It might be pointed out, however, that these modifications are very closely related to the original parameter.

III. Indian Fog Charts

Since air-mass conditions are so stagnant in India, the authors found that climatology could be used advantageously in forecasting fog. Use was made of the long period of Indian records (over 50 years) obtained from the Meteorological Observatory at Alipore. Records of this type should be utilized by forecasters whenever a situation is well catalogued.

Fog in the following charts refers to conditions when visibilities were reduced below 3,300 feet. The following is an explanation of the symbols used in the Indian fog charts.

$\bar{N}$ - Average number of days of fog
N_x - Maximum number of days of fog in any one year
N_n - Minimum number of days of fog in any one year
$\bar{D}$ - Average duration of fog when it occurs (in hours)
D_x - Maximum duration of fog in any individual occasion
D_n - Minimum duration of fog on any individual occasion
t_1 - Earliest time of commencement of fog
t_2 - Latest time of dissipation of fog
f^0 - Light fog
f - Moderate fog
$\underline{f}$ - Thick fog

IV. CONDITIONS OBSERVED DURING THE PASSAGE OF WARM OR OCCLUDED FRONTS DURING THE MONTHS OF JANUARY AND FEBRUARY

1. An incoming altostratus cloud layer above 10,000 feet gradually increases to broken or overcast condition with a noticeable increase in cumulus development in the afternoons.

2. This altostratus sheet moves from the south or southwest, producing broken to overcast ceilings at 8,000 to 10,000 feet. In the course of six or eight hours such ceilings lower to 3,000 to 4,000 feet in intermittent rain.

3. The sky clears with the dissipation or moving off of low clouds and ceilings lift gradually, but perceptibly, and become high broken to high scattered. Afternoon cumulus development becomes quite noticeable in the more moist air mass.

4. For one or two days after the passage of such a disturbance, conditions are usually favorable for the formation of scattered to broken altostratus clouds at 8,000 to 10,000 feet between midnight and 0800 IST. Light intermittent rain frequently falls from such clouds around daybreak.

AVERAGE NUMBER OF OCCASIONS OF FOG AT VARIOUS HOURS OF THE DAY

Month of OCTOBER

	HOUR OF THE DAY																		
Station	00	01	02	03	04	05	06	07	08	09	10	16	17	18	19	20	21	22	23
Tezpur	No occasions of Fog																		
Dibrugarh	3.4	3.2	3.2	3.0	2.2	1.0	0.4	0.2	0.2					0.4	2.2	3.0	3.2	3.4	3.4
Gauhati						2.6	3.0	2.4	1.0	0.6									
Shillong			0.2	0.2	0.4	0.6	0.4	0.4	0.4	0.2	0.2	1.4	1.6	1.4	0.4	0.2	0.2		
Aijal				0.5	0.5	0.5	10.0	10.0				6.5	6.5						
Silchar				0.2	1.4	1.8	1.2	0.4	0.2										
Calcutta	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.4										
Dhubri				0.2	0.4	0.4	0.4	0.8	0.8	0.2									
Dinajpur				0.2	0.2	0.2	0.2	0.2	0.2										

	N	N_x	N_n	D	D_x	D_n	Average No. of occasions of fog lasting four (hours) 0-2	3-4	5-6	7-8	9hrs	t_1	t_2	Nature of Fog	Wind
Tezpur	No occasions of Fog														
Dibrugarh	3.6	12	0	7.4	11	4		0.4	0.2	1.4	1.6	18	08	f^0f	1.5
Gauhati	3.0	4	2	2.1	4	1	2.2	0.8				05	09	f	1.2
Shillong	2.2	5	0	2.3	5	1	0.8	0.2	0.4			02 19	10 21	f^0f	1.2
Aijal	14.0	17	11	1.0	4	1	15.5	0.5				06 16	07 17	f	---
Silchar	1.8	7	0	2.0	4	2	1.4	0.4				03	08	f	1.5
Calcutta	0.4	1	0	4.5	8	1	0.2			0.8		00	08	f	---
Dhubri	0.8	2	0		6	1	0.4	0.2	0.2			03	08	f^0f	---
Dinajpur	0.2	1	0	5.0	5	5			0.2			03	08	f	---

AVERAGE NUMBER OF OCCASIONS OF FOG AT VARIOUS HOURS OF THE DAY

Month of November

Station	HOUR OF THE DAY 00	01	02	03	04	05	06	07	08	09	10	16	17	18	19	20	21	22	23
Tezpur					0.6	1.0	1.2	1.2	0.6	0.6									
Dibrugarh	7.8	7.8	9.0	9.8	10.8	10.6	9.4	7.0	2.4	0.4		0.2	1.2	5.6	7.8	7.8	7.2	6.6	6.6
Gauhati					0.8	10.2	11.0	11.4	11.4	4.8	1.8								
Shillong	0.4	0.4	0.4	0.2	0.2	0.2	0.2	0.2				0.6	0.8	0.6	0.6	0.8	0.8	0.6	0.4
Aijal							6.5	6.5				3.0	3.0						
Silchar	1.8	3.4	4.8	6.2	6.6	6.8	4.4	2.2	0.8							0.2	1.0	1.6	1.8
Calcutta					0.8	1.4	1.8	2.6	1.2	0.2									
Dhubri					0.6	1.2	1.8	3.2	2.8	1.0									
Dinajour	No occasion of fog																		

	N	N_x	N_n	D	D_x	D_n	Average No. of occasions of fog lasting for: (hours) 0-2	3-4	5-6	7-8	8/hrs	Nature of fog t_1	t_2		Wind
Tezpur	1.2	4	0	3.3	5	2	0.2	0.8	0.2			04	09	f	1.5
Dibrugarh	14.0	25	2	6.4	14	1	3.2	2.8	3.6	1.0	5.4	16	09	f°if	0.6
Gauhati	12.4	15	9	3.1	5	1	3.2	3.6	2.2	..	..	04	10	ff	1.1
Shillong	1.8	5	0	4.3	11	1	0.8	0.4			04	16	07	f	1.2
Aijal	9.5	11	8	1.0	1	1	9.5					06 16	07 17	f°ff	---
Silchar	7.4	17	0	4.3	12	2	0.8	3.6	1.0	1.2	0.6	20	08	f	1.0
Calcutta	2.6	7	0	2.0	5	1	1.6	0.6	0.2			04	09	f°ff	---
Dhubri	3.4	6	0		4	1	2.8	0.8				04	09	ff	---
Dinajour	No occasion of fog														---

AVERAGE NUMBER OF OCCASIONS OF FOG AT VARIOUS HOURS OF THE DAY

Month of December

HOUR OF THE DAY

Station	00	01	02	03	04	05	06	07	08	09	10	16	17	18	19	20	21	22	23
Tezpur					1.2	1.8	2.0	2.2	2.0	1.4	0.2								
Dibrugarh	13.0	12.8	14.0	14.4	16.6	17.8	21.2	19.8	6.6	1.6			1.0	4.8	9.2	11.8	11.4	11.2	11.8
Gauhati					0.2	18.8	19.4	18.6	17.8	7.8	2.8								
Shillong	0.4	0.4	0.4	0.4	0.4	0.2	0.2	0.2	0.2			2.0	2.0	2.0	1.4	0.8	0.6	0.4	0.4
Aijal					0.5	0.5	3.5	3.5	1.0	0.5	0.5								
Silchar		4.2	5.2	7.8	9.6	11.4	8.8	4.6	2.4	2.2	0.4								
Calcutta	0.2	0.4	0.6	0.4	1.0	2.2	3.6	5.6	5.2	3.4							0.2	0.2	0.2
Dhubri				1.0	4.4	4.8	5.6	5.4	4.6	1.8									
Dinajpur	No occasion of fog																		

	N	N_x	N_n	D	D_x	D_n	Average No. of occasions of fog lasting for: (hours) 0-2	3-4	5-6	7-8	8/hrs	Nature t_1	t_2	of fog	Wind
Tezpur	2.4	5	0	3.6	6	1	0.8	0.8	0.8			04	16	f	1.4
Dibrugarh	24.2	29	20	6.8	16	1	6.8	4.0	1.4	1.8	10.8	17	09	f°ff	0.5
Gauhati	21.2	24	15	3.1	6	1	6.0	12.4	3.0			04	10	ff	1.1
Shillong	2.6	10	0	3.8	16	1	1.6	0.6			0.4	16	08	ffd	1.2
Aijal	3.5	6	1	2	4	1	2.5	1.0				05 16	07 17	f°ff	——
Silchar	11.8	23	2	3.7	8	2	2.2	6.6	2.6	0.4		01	10	ff	0.9
Calcutta	6.6	11	4	2.5	7	1	4.0	1.4	0.8	0.4		01	09	ff	——
Dhubri	7.2	12	2		6	1	4.2	2.2	1.2			03	09	f°ff	——
Dinajpur	No occasion of fog														——

AVERAGE NUMBER OF OCCASIONS OF FOG AT VARIOUS HOURS OF THE DAY

Month of January

HOUR OF THE DAY

Station	00	01	02	03	04	05	06	07	08	09	10	16	17	18	19	20	21	22	23
Tezpur				0.4	1.8	2.0	2.0	2.0	1.4	0.4	0.2								
Dibrugarh	10.8	10.4	11.8	12.4	15.9	17.2	19.0	17.6	9.2	3.2	0.8		0.6	4.0	8.0	8.8	10.6	11.2	11.4
Gauhati					0.2	8.8	11.2	10.2	9.6	5.2	0.8								
Shillong					0.2	0.2	0.2	0.2	0.2	0.4	0.2	1.2	1.4	1.4	1.0	0.2	0.2		
Aijal						0.5	1.0	1.0	0.5	0.5	0.5	0.5	0.5						
Silchar		1.8	2.4	3.6	4.0	4.2	3.6	2.8	1.8	1.2	1.2								
Calcutta		0.2	0.2	0.6	1.8	3.2	9.0	11.2	8.2	5.2	0.4								
Dhubri					2.6	4.6	5.6	9.2	7.6	1.0									
Dinajpur					0.4	1.2	1.2	1.2	0.8										

	N	N_x	N_n	D	D_x	D_n	Average No. of occasions of fog lasting for: 0-2 (hours)	3-4	5-6	7-8	8/hrs	Nature of fog: t_1	t_2		Wind
Tezpur	2.2	5	0	3.7	7	1	0.4	1.4	0.2	0.2		03	10	ff	1.1
Dibrugarh	23.0	28	14	7.1	14	1	4.8	6.0	1.4	0.8	9.8	17	10	f^0ff	0.6
Gauhati	12.0	13	10	2.8	5	1	4.6	6.6	0.8			04	10	ff	1.2
Shillong	2.0	9	0	2.4	5	1	0.8	1.0	0.2			04 16	10 21	ff_d	1.5
Aijal	1.5	2	1				1.0		0.5					f^0f	—
Silchar	4.6	11	2	4.4	9	1	1.0	1.6	1.0		1.2	01	10.30	ff	1.1
Calcutta	11.2	14	7	2.5	9	1	4.0	5.0	2.0			01	10	ff	—
Dhubri	9.4	12	5		5	1	5.0	4.2	0.2			04	09	f^0ff	—
Dinajpur	1.2	2	0	3.0	4	2	0.4	0.8				04	08	f^0ff	—

AVERAGE NUMBER OF OCCASIONS OF FOG AT VARIOUS HOURS OF THE DAY

Month of February

Station	HOUR OF THE DAY 00	01	02	03	04	05	06	07	08	09	10	16	17	18	19	20	21	22	23
Tezpur				0.2	0.2	0.4	0.6	0.8	0.8	0.6									
Dibrugarh	3.6	3.6	4.4	4.4	4.6	5.2	3.8	3.2	1.8	0.2				1.2	2.8	3.2	3.4	3.0	3.0
Gauhati						1.6	3.0	2.8	2.8	1.0									
Shillong												0.2	0.4	0.4	0.4				
Aijal	No occasions of fog																		
Silchar	0.2	0.2	0.6	0.8	0.8	0.6	0.4	0.2											
Calcutta	0.6	0.8	0.8	1.2	2.6	5.6	8.0	9.4	7.0	2.8	0.6								
Dhubri					0.8	2.0	2.0	2.6	1.0	0.2									
Dinajpur				0.2	0.4	0.4	0.4	0.4	0.4										

	N	N_x	Nn	D	D_x	D_n	Average No. of occasions of fog lasting for: (Hours) 0-2	3-4	5-6	7-8	8/hrs	Nature of fog t_1	t_2	fog	Wind
Tezpur	0.8	2	0	3.5	6	2	0.4	0.2	0.2			03	09	ff	2.3
Dibrugarh	8.4	13	4	6.4	14	1	1.6	1.8	0.4	0.8	2.6	18	09	f°ff	1.0
Gauhati	3.0	7	0	2.8	4	1	1.2	1.8				05	09	f	1.5
Shillong	0.6	1	0	2.3	3	2	0.4	0.2				16	19	f-S_t	2.3
Aijal	No occasions of fog														—
Silchar	0.8	2	0	4.0	8	2	0.2	0.4		0.2		01	09	f	1.5
Calcutta	10.4	14	7	2.8	10	1	5.4	4.0	0.4			00	10	ff	—
Dhubri	2.6	9	0		4	1	0.6	2.0				04	09	f°f	—
Dinajpur	0.4	1	0	4.5	5	4		0.2	0.2			03	08	f	—

AVERAGE NUMBER OF OCCASIONS OF FOG AT VARIOUS HOURS OF THE DAY

Month of March

Station	HOUR OF THE DAY 00	01	02	03	04	05	06	07	08	09	10	16	17	18	19	20	21	22	23
Tezpur	No occasions of fog																		
Dibrugarh	2.2	2.2	2.4	3.6	3.2	2.2	0.6	0.2	0.2						0.8	1.2	1.4	1.6	1.8
Gauhati							0.2	0.2	0.2	0.2									
Shillong	No occasions of fog																		
Aijal	No occasions of fog																		
Silchar					0.2	0.2	0.2	0.2	0.2										
Calcutta				1.2	1.6	3.4	3.8	2.8	1.0	0.2									
Dhubri	No occasions of fog																		
Dinajpur					0.2	0.2	0.2	0.2	0.2	0.2									

	N	N_x	N_n	D	D_x	D_n	Average No. of occasions of fog lasting for: (Hours) 0-2	3-4	5-6	7-8	8/hrs	Nature t_1	t_2	of fog	Wind
Tezpur	No occasions of fog														3.3
Dibrugarh	4.2	11	0	4.9	9	1	1.2	1.0	0.6	1.0	0.4	19	08	f	1.4
Gauhati	0.2	1	0	0.6	3	3		0.2				06	09	f	1.9
Shillong	No occasions of fog														4.2
Aijal	No occasions of fog														—
Silchar	0.2	1	0		5				0.2			04	09		1.9
Calcutta	4.4	7	3	2.9	3	1	2.4	2.0				03	09	ff	—
Dhubri	No occasions of fog														—
Dinajpur	0.2	1	0	5.0	5	5		0.2				04	09	f	—

5. Visibilities seldom lower below three to four miles at any time except in moderate to heavy rain showers.

6. Scattered thunderstorms frequently occur in the late afternoon or early morning hours (Midnight to 0600 IST) while the disturbance is present, especially during the month of February.

7. Anticyclonic conditions over the area during the period normally produce clear skies, although occasional high scattered cirrus clouds and scattered to broken lower cloud cover (due to cumulus formation over the mountains and the blowing of these clouds across the valley) are not unusual. After 1700 IST these clouds begin to dissipate, and by 2200 IST the sky clears and remains so until 0900 or 1000 IST. Such a clearing inevitably produces all the conditions for heavy ground fog during the morning hours.

V. PRACTICAL AIDS IN FORECASTING FOG IN THE BRAHMAPUTRA VALLEY

1. Rain and dense fog are seldom combined. Heavy fog may set in after the rain stops and the overcast clears in the evening; but when there is rain, visibilities during the evening are seldom less than three miles.

2. Fog sets in earlier on clear nights if the preceding day was cloudy or if the air had a trajectory over moist areas.

3. It is almost impossible for conditions to arise in the valley where all fields are closed for landings simultaneously.

4. Sookerating and Jorhat are usually the first stations to report closed conditions on nights of heavy fog.

5. Tezpur is so located that drainage into or out of the area is small enough not to be an important factor in fog formation.

6. Frequently when Jorhat is closed, Dergaon is open.

7. Chabua, Dinjan, and Mohanbari may be alternately open and closed as the patches of fog begin to form or as they begin to break and drift with the winds.

8. Jorhat is so located that fog on the adjacent tea gardens surrounds the field and may spread over the runway from any direction. The winds most likely to carry fog from the tea gardens over the strips seems to be one or two to four miles per hour. If the wind is either calm or above six miles per hour, fog may be expected to come in later.

9. It is very important to forecast the cloud conditions in making a prediction as to the time of fog formation. The soundings, synoptic maps, etc., should be carefully analyzed. Station pibal data should likewise be noted carefully since a veering or backing of winds at the cloud level indicates whether the clouds will increase or dissipate, a factor determined by the direction toward which the winds are shifting.

10. By using the evening pibal at Lalmanir Hat regions of stability and instability below 4,000 feet (as determined from the hodograph) were found very useful in forecasting the intensity of fog formation in different sectors. If stability lies to the east or northeast, early formations of heavy fog may be anticipated in the valley. If the stability lies to the south, that area is certain to be heavily covered

with fog. Also an advection of cold air aloft seems to bring about conditions more favorable for early fog formation.

11. By use of the radiosonde the level to which convection will mix the air can be found. The potential temperature at this level is a good measure of the time of fog formation under like synoptic conditions.

12. The ideal conditions for fog formation are moist air near the surface with dry air aloft.